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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Walter Alvarez and Leandro Balzano

jc997 U.S. PRO  
09/996142



Serial No.: Not Yet Assigned

Atty. Dkt. No.: 5820.613

Filed: Herewith

Art Unit: 1755

For: PROCESS AND APPARATUS FOR  
PRODUCING SINGLE-WALLED  
CARBON NANOTUBES

Examiner: Unknown

Box Patent Application  
Commissioner for Patents  
Washington, D.C. 20231

INFORMATION DISCLOSURE STATEMENT

List of Sections Forming Part of This  
Information Disclosure Statement

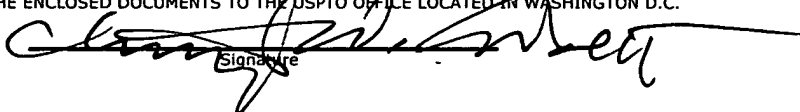
The following sections are being submitted for this  
Information Disclosure Statement:

1. ☒ Preliminary Statements
2. ☒ Form PTO-1449 (Modified)
3. ☐ Statement as to Information Not Found in  
Patents or Publications (Information Not  
Listed in Form PTO-1449 (Modified))
4. ☐ Identification of Prior Application in Which  
Listed Information Was Already Cited and for  
Which No Copies Are Submitted or Need Be  
Submitted

Send to: Box Patent Application, Commissioner for Patents, Washington, D.C. 20231

\*\*I hereby certify that due to the indefinite suspension of U.S. Post Office Express Mail services, and pursuant to U.S. Patent and Trademark Office ("USPTO") instructions on 11/19/2001, this Application and accompanying documents is being deposited for U.S. Express Mail in an envelope addressed to: COMMISSIONER FOR PATENTS, 2900 CRYSTAL DRIVE, ARLINGTON, VA 22202-3513. IT IS FURTHER OUR UNDERSTANDING THAT THE USPTO WILL BE RESPONSIBLE FOR FORWARDING ALL OF THE ENCLOSED DOCUMENTS TO THE USPTO OFFICE LOCATED IN WASHINGTON D.C.

Christopher W. Corbett  
Name of applicant, assignee or  
registered representative  
5820.613 IDS.wpd

  
Signature

5. ☒ Copies of Listed Information Items  
Accompanying this Statement
6. ☒ Identification of Person(s) Making this  
Information Disclosure Statement

**Section 1. Preliminary Statements**

Applicants submit herewith patents, publications or other information of which they are aware, which they believe may be material to the examination of this application and in respect of which there may be a duty to disclose.

The filing of this information disclosure statement shall not be construed as a representation that a search has been made (37 C.F.R. § 1.97(g)), an admission that the information cited is, or is considered to be, material to patentability or that no other material information exists.

The filing of this information disclosure statement shall not be construed as an admission against interest in any manner. Notice of January 9, 1992, 1135 O.G. 13-25, at 25.

**Section 2. Form PTO-1449 (Modified)**

- ☒ A completed Form 1449 (Modified) is attached hereto.
- ☐ No Form 1449 (Modified) is attached.

**Section 3. Statement as to Information Not Found in Patents or Publications (Information Not Listed in Form PTO-1449)**

**Section 4. Identification of Prior Application in Which Listed Information Was Already Cited and for Which No Copies Are Submitted or Need Be Submitted**

This application relies, under 35 U.S.C. § 120, on the earlier filing date of prior provisional application Serial No. 60/253,877, filed on November 29, 2000.

**Section 5. Copies of Listed Information Items Accompanying this Statement**

☒ Legible copies of all items listed in Form PTO-1449 (Modified) accompany this information disclosure statement.

☐ Exception(s) to above:

☐ Items in prior application from which an earlier filing date is claimed for this application, as identified in Section 4. Only copies of the following patents are enclosed:

**Section 6. Identification of Person(s) Making this INFORMATION DISCLOSURE STATEMENT**

The person making this statement is the attorney who signs below on the basis of the information:

☒ supplied by the inventor(s)

☐ supplied by an individual associated with the filing and prosecution of this application (37 C.F.R. § 1.56(c)).

☒ in the attorney's file

Respectfully submitted,



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**FORM PTO-1449**U.S. DEPARTMENT OF COMMERCE  
Patent and Trademark OfficeAttorney's Docket Number  
**5820.613**Serial Number  
Not Yet Assigned

(Fill-A-Form 7.92)

**INFORMATION DISCLOSURE CITATION**

(Use several sheets if necessary)

Applicant **Daniel E. Resasco, et al.**Filing Date **Herewith**Group **Unknown****U. S. PATENT DOCUMENTS**

EXAM INIT.		DOCUMENT NUMBER							DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA	4	6	6	3	2	3	0	05/05/1987	Tennent	428	367	1997 U.S. PRO 09/96142 11/98/01
	AB	5	1	6	5	9	0	9	11/24/1992	Tennent et al.	423	447	
	AC	5	2	2	7	0	3	8	07/13/1993	Smalley et al.	204	173	
	AD	5	3	0	0	2	0	3	04/05/1994	Smalley	204	157	
	AE	5	4	8	2	6	0	1	01/09/1996	Ohshima et al.	204	173	
	AF	5	5	4	3	3	7	8	08/06/1996	Wang	502	174	
	AG	5	5	5	6	5	1	7	09/17/1996	Smalley	204	157	
	AH	5	5	6	0	8	9	8	10/01/1996	Uchida et al.	423	461	
	AI	5	5	7	8	5	4	3	11/26/1996	Tennent et al.	502	180	
	AJ	5	5	8	7	1	4	1	12/24/1996	Ohshima et al.	423	461	
	AK	5	5	9	1	3	1	2	01/07/1997	Smalley	204	157	
	AL	5	6	0	3	9	0	7	02/18/1997	Grochowski	423	210	
	AM	5	6	4	8	0	5	6	07/15/1997	Tanaka	423	445	
	AN	5	6	4	1	4	6	6	06/24/1997	Ebbesen et al.	423	447	
	AO	5	6	9	5	7	3	4	12/09/1997	Ikazaki et al.	423	461	
	AP	5	6	9	8	1	7	5	12/16/1997	Hiura et al.	423	447	
	AQ	5	7	0	7	9	1	6	01/13/1998	Snyder et al.	502	416	
	AR	5	7	4	4	2	3	5	04/28/1998	Creehan	428	364	
	AS	5	7	5	3	0	8	8	05/19/1998	Olk	204	173	
	AT	5	7	7	3	8	3	4	06/30/1998	Yammamoto et al.	204	192	
	AU	5	7	8	0	1	0	1	07/14/1998	Nolan et al.	427	216	
	AV	5	8	1	4	2	9	0	09/29/1998	Niu et al.	423	344	
	AW	5	8	7	7	1	1	0	03/02/1999	Snyder et al.	502	180	
	AX	5	9	6	5	2	6	7	10/12/1999	Nolan et al.	428	408	
	AY	5	9	8	5	2	3	2	11/16/1999	Howard et al.	423	447	
	AZ	5	9	9	7	8	2	3	12/07/1999	Lieber et al.	423	249	

## FOREIGN PATENT DOCUMENTS

EXAM INIT.	Office	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
							YES	NO
	BA	PCT/US00/15362		International Search Report				
	BB	9709272	03/13/1997	PCT/US			X	
	BC	98392550	09/11/1998	PCT/US			X	
	BD	9842620	10/01/1998	PCT/JP				X
	BE	406122489	05/1994	Japan			X	
	BF	WO 00/17102	03/30/2000	PCT International Publication				

EXAM INIT.		OTHER DOCUMENTS	
		(Including, Author, Title, Date, Pertinent Pages, Etc.)	
	CA	Bethune et al.; "Cobalt-Catalysed Growth of Carbon Nanotubes with Single-Atomic-Layer Walls," <u>Nature</u> , 363:605-607, Jun 1993.	
	CB	V. Brotons et al., "Catalytic influence of bimetallic phases for the synthesis of single-walled carbon nanotubes", JOURNAL OF MOLECULAR CATALYSIS, A: Chemical 116 (1997) 397-403.	
	CC	Cassell et al., "Large Scale CVD Synthesis of Single-Walled Carbon Nanotubes", AMERICAN CHEMICAL SOCIETY, pp. 6483-6492, 1999.	
	CD	Che et al., "Chemical Vapor Deposition Based Synthesis of Carbon Nanotubes and Nanofibers Using a Template Method", CHEMICAL MATER. 1998, 10, PP. 260-267.	
	CE	Chen et al., "Growth of carbon nanotubes by catalytic decomposition of CH <sub>4</sub> or CO on a Ni-MgO catalyst", CARBON VOL. 35, No. 10-11, pp. 1495-1501, 1997.	
	CF	Cheng et al.; "Bulk Morphology and Diameter Distribution of Single-Walled Carbon Nanotubes Synthesized by Catalytic Decomposition of Hydrocarbons," Chemical Physics Letters, 289:602-610, 1998.	
	CG	Cheng et al.; "Large-Scale and Low-Cost Synthesis of Single-Walled Carbon Nanotubes by the Catalytic Pyrolysis of Hydrocarbons," Applied Physics Letters, 72(25):3282-3284, 06/25/98.	
	CH	Dai et al.; "Single-Wall Nanotubes Produced By Metal-Catalyzed Disproportionation of Carbon Monoxide," Chemical Physics Letters, 260:471-475, 1996.	
	CI	Database, Accession No. 1999-366878, Cano, "Canno KK", XP-002149235, 05/25/1999.	
	CJ	Fonseca et al., "Synthesis of single-and multi-wall carbon nanotubes over supported catalysts", APPLIED PHYSICS A, 67, PP. 11-22, 1998.	

EXAM INIT.	OTHER DOCUMENTS <small>(Including, Author, Title, Date, Pertinent Pages, Etc.)</small>	
CK	Govindaraj et al., "Carbon structures obtained by the disproportionation of carbon monoxide over nickel catalysts", MATERIALS RESEARCH BULLETIN, Vol. 33, No. 4, pp. 663-667, 1998.	
DA	Hafner et al., "Catalytic growth of single-wall carbon nanotubes from metal particles", CHEMICAL PHYSICS LETTERS, 296, PP 195-202, 1998.	
DB	Hernadi et al., "Catalytic synthesis of carbon nanotubes using zeolite support", ELSEVIER SCIENCE INC. 1996.	
DC	HYPERION CATALYSIS INTERNATIONAL Website; <a href="http://www.fibrils.com/esd.htm">http://www.fibrils.com/esd.htm</a> ; "Unique Slough Resistant SR™ Series ESD Thermoplastic Product Line Offers Reduced Particle Contamination For Demanding Electronic Applications," and Hyperion Homepage <a href="http://www.fibrils.com">http://www.fibrils.com</a> .	
DD	Iijima, Sumio; "Helical Microtubules of Graphitic Carbon," Nature, 354:56-58, Nov 1991.	
DE	Iijima et al.; "Single-Shell Carbon Nanotubes of 1-nm Diameter", Nature 363:603-605, Jun 1993.	
DF	Ivanov et al.; "The Study of Carbon Nanotubes Produced by Catalytic Method," Chemical Physics Lettersm 223:329-335, 1994.	
DG	Journet et al.; "Large-Scale Production of Single-Walled Carbon Nanotubes by the Electric-Arc Technique," Nature, 338:756-758, Aug 1997.	
DH	B. Kitiyanan et al., "Controlled production of single-wall carbon nanotubes by catalytic decomposition of CO on bimetallic Co-Mo catalysts", CHEMICAL PHYSICS LETTERS, 317 (2000), pp. 497-503, 2/4/2000.	
DI	Krishnankutty et al.; "The Effect of Copper on the Structural Characteristics of Carbon Filaments Produced from Iron Catalyzed Decomposition of Ethylene," Catalysts Today, 37:295-307, 1997.	
DJ	Li et al., "Large-Scale Synthesis of Aligned Carbon Nanotubes", SCIENCE, Vol. 274, pp. 1701-1703.	
DK	Rinzler et al.; "Large-Scale Purification of Single-Wall Carbon Nanotubes: Process, Product, and Characterization," Applied Physics A, 67:29-37, 1998.	
DL	Thess et al., "Crystalline Ropes of Metallic Carbon Nanotubes, SCIENCE, Vol. 273, pp. 483-487.	
DM	I. Willems et al., "Control of the outer diameter of thin carbon nanotubes synthesized by catalytic decomposition of hydrocarbons", CHEMICAL PHYSICS LETTERS, 317 (2000) pp. 71-76.	
DN	Yakobson et al.; "Fullerene Nanotubes: C <sub>1,000,000</sub> and Beyond," <u>American Scientist</u> , 85:324-337, Jul-Aug 1997.	
EXAMINER		DATE CONSIDERED
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609: Draw line through citation if not in conformance and not considered. Include a copy of this form with next communication to the applicant.		